

FIBROUS STRICTURE^{*} OF THE CESOPHAGUS
TREATED BY GASTROTOMY AND
RETROGRADE DILATATION.[†]

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[N March, 1890, I had the privilege of laying before the Academy the details of four cases of fibrous stricture of the cesophagus treated in various ways. One was treated by gradual dilatation, the treatment occupying over seven months. One was treated by electrolysis alone, the current being applied on eleven occasions, extending over a period of four and a half months. In the remaining two cases immediate dilatation or rupture was employed followed by the use of bougies, in one case daily for two months, in the other, in which this treatment was supplemented by electrolysis, for eighteen days. I am glad to be able to report that in all these cases the patients are at the present time in good health and in no way troubled by their former strictures.

I now desire to add to this list a case of fibrous stricture of the cesophagus situated near the cardiac orifice, which, owing to the difficulty of getting through it bougies passed through the mouth, required to be treated by a method different to any I had hitherto employed.

The case was that of a young lady, aged twenty-four, who consulted me on June 16, 1892, for dysphagia. The history of her trouble began when she was seven years of age, after an attack of scarlatina. For two years after that she found the greatest difficulty

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in swallowing solids. Sometimes when taking a long drink she felt as if something were sticking in her throat. At the end of two years she was able to take soft solids, but it was several years before she was able to eat meat. At this period she was living in Belfast, but five years previous to my seeing her she came up to school in Dublin. In 1890, as the dysphagia was becoming worse, she consulted Dr. Mc-Cutcheon. In June, 1892, he kindly sent her to me. She told me that every mouthful felt as if it would choke her, especially if it were a little larger than usual. On one occasion about ten years previously a piece of citron had stuck in the gullet, and did not come up again for a month. Sometimes she found even fluids difficult to get down, especially if they were effervescent. She never suffered from nausea, the food, as a rule, simply regurgitating shortly after it was swallowed. The severity of the symptoms varied a good deal, and was increased when she was in a strange house or by nervousness. Her general health was good and all the functions normal. As a rule, she was not able to get down sufficient food to satisfy her hunger, and she was losing flesh. She was anaemic, and had lost strength and energy. She was five feet two and half inches in height, and weighed five stone seven pounds. A year previously she weighed eight stone.

On examination with a full-sized œsophageal bougie, I found that it passed readily down the œsophagus until it reached a point about twelve and a half inches from the teeth. Here it was arrested. I then proceeded to determine as nearly as possible its exact position.

The stricture was $12\frac{1}{2}$ inches or $32\frac{1}{2}$ cm. from the teeth. Mackenzie gives the distance of the opening of the œsophagus from the teeth as $15\frac{1}{2}$ to 17 cm. Assuming that in a girl of her size this distance was approximately 16 cm., the obstruction was situated at a point about $16\frac{1}{2}$ cm. from the upper opening of the œsophagus. Now Mackenzie states that the normal length of the œsophagus in the adult is 24 to 26 cm. Supposing that the lesser figure was near the truth in this case, the stricture was situated about $7\frac{1}{2}$ cm. from the cardiac orifice,—that is, nearly 3 inches.

I tried repeatedly to get a bougie to pass. The impression which my attempts made upon my mind was that I had to do with a largely dilated *cul-de-sac* low down in the œsophagus, at some portion of the floor of which there was an opening, if only I could find it. There was evidently no growth to deal with, judging by the sensation conveyed through the bougies. The success which attended these attempts was very limited. On three occasions only, on June 16,

18, and 21, I succeeded, after prolonged probing with the bougie, in getting instruments which measured seven millimetres (a little over a quarter of an inch) in diameter through the stricture. I could not get a larger instrument, and the only good which resulted from passing these bougies was the information they afforded as to the nature of the stricture with which we had to deal. They showed that the stricture was firm and quite smooth and regular.

On June 30, Dr. Ball met me in consultation. He again endeavored to pass bougies, but failed to find the opening. We came to the conclusion that the best thing to do for the patient was to attempt to reach the stricture from below through an opening in the stomach. The advantages of this method of reaching the obstruction were that, as the measurement showed the stricture to be about three inches from the cardia, it would be possible to reach it and possibly to bore through it with the finger; secondly, the oesophagus below the stricture not being dilated as it was above, it would be a much simpler matter to guide an instrument through the stricture from below, and there seemed to be very little likelihood of dilating the stricture from above. The risks and advantages of this method were placed before the patient, and she readily agreed to operation, feeling that any risk was worth incurring provided she could be relieved from the slow process of starvation she was undergoing.

On July 6 the patient was placed under anaesthesia by Dr. Piel, at 10.30 A.M. Dr. Ball assisted me at the operation, and Professor Lannelongue, of Paris, and Dr. Heron Watson, of Edinburgh, favored me with their presence. An incision five inches in length was made in the middle line from the ensiform cartilage downward. When the peritoneum was opened the left lobe of the liver appeared, and behind and to the left of this the stomach was found. It was so contracted that it looked at first like the colon, but when it was drawn outward through the wound the absence of white bands and the arrangements of the blood-vessels proved it to be the stomach. An opening about an inch in length was then made into the stomach through its anterior wall about midway between the curvatures and at an equal distance from each orifice. The wound all round the opening was well packed with sponges, and the stomach was washed out with warm boric solution. Nothing but mucus and gastric secretions was found in the stomach. I then passed my right index finger into the stomach and my whole hand into the abdomen, and, pushing the anterior wall of the stomach before me, I readily found the cardiac orifice up

behind the left lobe of the liver. When I had passed my finger up the œsophagus as far as it could reach, I just succeeded in reaching the stricture and exploring it, but the length of my finger would not permit me to do more. As, from the measurements I had taken, I had anticipated this difficulty, I had an Otis dilating urethrotome in readiness, with the blade removed. I now passed this instrument up along my finger through the cardiac orifice, and, guided by my finger, it readily passed into the stricture, which it fitted fairly accurately. The dilator was then screwed up to its full limit of expansion in an antero-posterior direction, and was then withdrawn fully dilated. A flattened œsophageal bougie was then passed down the œsophagus from the mouth, but it impinged on the stricture and refused to pass farther. The dilator closed was again passed upward and again fully expanded, this time in a lateral direction,—that is, at right angles to the former dilatation. It was again withdrawn fully open. The bougie passed from the mouth now emerged into the stomach without the smallest difficulty. I drew its extremity out through the abdominal wound and bored a hole through it. Through this hole I passed a stout piece of silk and knotted it firmly. I then withdrew the bougie back along the same road it had already traversed, carrying the silk with it. I now had a strong silk thread passing from the mouth through the œsophagus, the stomach, and out through the abdominal wound. A plug of gauze was now made about the size of the finger. To one end of this the lower end of the silk was fastened securely. I then fastened another piece of silk to the other end of the plug, and by means of these silk threads I was able to draw the plug upward and downward through the stricture, which it traversed with comparative ease. Finally, I allowed the plug to remain in the stricture, and then I cut short the lower end in the stomach, leaving the upper line of silk hanging from the mouth.

The wound in the stomach was now closed by a continuous suture of fine silk, uniting the mucous coat, and a second continuous Lembert suture, which united the peritoneal coat. The stomach was then allowed to fall back into the abdomen. When the "toilet" of the peritoneum was completed the abdomen was closed by two rows of sutures, the first uniting the peritoneum, the second embracing all the other layers, including the skin. The dressings were applied, and the patient, who bore the operation very well, was removed to bed, and $\frac{1}{2}$ grain of morphia with $\frac{1}{20}$ grain of atropia was administered hypodermically. She was ordered peptonized nutrient enemata every four

hours. At 6 p.m. I withdrew the plug. She was allowed to suck a little ice, but nothing else was given by the mouth until the fourth day, when four ounces of milk and two drachms of Denayer's peptonate of meat were given alternately every fourth hour. The enemata were discontinued on the fifth day, as she was then able to swallow her nourishment well. On the ninth day she was allowed fish and bread and milk, and chicken on the tenth day. On the thirteenth day I passed a bougie with ease into the stomach; but that night she suffered some pain, and the next day there was a slight rise of temperature, which, however, came down the following day; but at no time during her convalescence did the temperature exceed 100.2° F.

On the twenty-first day she walked up to my house to see me. She was then able to eat good solid meals without the smallest difficulty or pain.

For over two months I made no further attempts to pass a bougie. On the 28th of September, 1892, I found the patient very much improved in health and condition. She now weighed six stones thirteen pounds as against five stones seven pounds on June 30,—that is, a gain of nearly a stone and a half.

I also found that I could pass a bougie No. 27, French gauge, with ease. On September 30 I passed a bougie measuring $1\frac{7}{16}$ inches in circumference. On October 26 I began electrolysis, and repeated it at intervals varying from a fortnight to a month until January 25, when my largest electrode, measuring two inches in circumference, passed with ease. Since then I have passed at intervals of from one to two months large bougies measuring $2\frac{1}{8}$ inches in circumference, which pass without any difficulty or pain. She enjoys excellent health.

The idea of attacking an impermeable stricture of the oesophagus, of a benign character, from below originated with Professor Loreta, of Bologna, and his first operation was performed in October, 1883.

As the case I have just recorded is, as far as I am aware, the first of the kind performed in the United Kingdom, it may not be uninteresting if I refer shortly to the history of the operation and point out the various modifications which have found favor with operators. Including the case I have recorded, the operation has been done 21 times, of which 7 have been per-

formed in Italy, the country of its birth, 3 have been done in America, 1 in France, 9 in German-speaking countries, and 1 in Ireland. Of these 21 cases, the result is known in 20. These all recovered. I have been unable to find the result of Case 13.¹

On examining the record of these cases, it will be observed that surgeons have employed one of two methods in carrying out the treatment of cesophageal strictures by dilatation from below. The whole process may be completed at once, or it may be divided into two stages.

As originally proposed and carried out by Loreta, as soon as the stomach has been exposed it is opened, the cardiac orifice is sought for, a dilator, guided by the finger, is passed through the stomach into the oesophagus and is insinuated into the stricture, and the stricture is at once forcibly dilated. That sufficient has been done is tested by the passage of a bougie from the mouth downward. The stomach wound is then immediately closed, the abdominal wound sutured, and the operation completed.

The other method consists in at first performing gastrostomy, —that is, in fixing a piece of the stomach into a wound made in the left epigastric region. The stomach is not usually opened for two or more days, and nothing further is done until a gastric fistula has become firmly established. When this is attained (in Dixon's case, Case 18, twenty-four days after gastrostomy), the stricture is attacked through the fistula, generally assisted by the passage of various devices from above. When dilatation has sufficiently advanced to permit of the further treatment being carried out from above, the gastric fistula is allowed to heal, or is closed by a plastic operation.

Each of these methods has its own advantages. The former, or Loreta's method, completes the operation at once, and nothing remains to be done except to secure the patient against the risks of recontraction by the occasional passage of a bougie through

¹ I have not included in this list the case reported by R. F. Weir in the New York Medical Record, 1891, XL, 89, as, although gastrostomy was performed, the stricture was subsequently dilated from above. It was not a case of retrograde dilatation.

the mouth. The recovery is rapid: in Loreta's first two cases, eighteen and twenty days respectively; in my own case, twenty-one days. Again, the immediate method enables the surgeon to make a digital examination of the stricture, even if it be situated as high up as three inches above the cardiac orifice. It is impossible to explore even the cardiac orifice with the finger through a gastric fistula, unless the patient be a child and the fistulous opening in the stomach be large enough to admit the finger. In a case recently in which I had the opportunity and privilege of assisting Mr. Myles, we found it impossible to pass the finger into the lower end of the oesophagus, except after the introduction of the entire hand into the cavity of the stomach. We then discovered the stricture about three inches from the cardia; but, unfortunately, it proved to be malignant, and dilatation was impossible.

The second method, or the operation *à deux temps*, may perhaps be shown to have some slight advantage on the score of safety, but this I very much doubt. The table of cases which I have drawn up does not help us in this matter, as they do not show a fatal result from either method of procedure hitherto. But even if there were some slight additional immediate risk in Loreta's method, this is more than counterbalanced by the advantages, immediate and remote, of finishing the operation at once, and leaving the patient without a gastric fistula, which at any rate in one case, Case 16, had not closed at the end of fifteen months.

There is, however, one class of cases in which Loreta's method would not be admissible, and in which the establishment of a gastric fistula becomes a matter of necessity. In cases of extensive injury to the oesophagus, caused by swallowing a strong corrosive, such as sulphuric acid or caustic potash, where the greater portion of the whole length of the oesophagus is in a strictured condition, it would be manifestly impossible to employ immediate dilatation for its relief. A prolonged system of gradual dilatation with bougies can then alone be relied on, and this can be carried out more easily and more surely from below than from above. In such cases the operation *à deux temps* has an established and unassailable position in surgery.

In examining the table of cases we find that the operation *à deux temps*, when a gastric fistula is formed as a preliminary, has been performed thirteen times, while Loreta's method has been carried out eight times. It is evident, however, that the principle which guided the operators in the selection of the method had nothing to do with the nature of the stricture. It appears to be a question of nationality. Loreta's method was employed in the seven Italian cases and in my case. In France, Germany, and America the operation *à deux temps* has been invariably adopted. It is difficult to account for this except by the supposition that there is diminished risk in fixing the stomach into the wound of the abdomen some days previous to opening the stomach itself. I believe, however, Loreta's method will come more and more into use, for the reason that, with proper precautions, the risk of opening the stomach at once can be reduced practically to *nil*, whilst if we form a fistula we must forego certain other very decided advantages to the patient.

In advocating gastrotomy as a method of dealing with œsophageal stricture it should be distinctly understood that we do not suggest it as an alternative to the ordinary method of dealing with these strictures *from above*, such as dilatation, internal or external œsophagotomy, or electrolysis. As long as bougies passed through the mouth can be made to traverse an œsophageal stricture,—that is, as long as the ordinary methods of treatment from above give any hope of a successful issue,—so long the question of gastrotomy does not arise. It is only when the stricture is practically impermeable from above that Loreta's method, or one of its modifications, becomes a necessity to save the patient from starvation, or from the short-lived misery of a permanent fistula in the stomach, through which he must be fed until nature requires sustenance no longer. It is noteworthy how frequently a fistula which seems to be impervious when tested by bougies passed through the mouth admits with comparative ease the bougie passed upward from the stomach. In the case I have reported it was only after prolonged efforts and after many trials that I succeeded in getting a bougie through the stricture from above, and when it was once withdrawn I could not get another

one in, and yet at the operation an Otis dilator passed through the stricture almost at the first attempt. Other operators have recorded the same experience; and the reason for it is easily understood. From the frequent efforts to take food, continued for months, it may be for years, the oesophagus above the stricture has become so greatly dilated as almost to form a large pouch. Somewhere at the bottom of this pouch there exists a small opening through which the liquid portion of the food can trickle.

The wonder, then, is that a bougie, probing about the floor of this well, strikes as frequently as it does the aperture and passes through it. This aperture may be so small or situated at one side in such a position that it cannot be found. The condition of the oesophagus at the other side of the stricture is quite different. Here there is no such pouch. On the contrary, the oesophagus is generally contracted by disuse and forms more or less of a funnel, so that a bougie passed from below is, as it were, guided to the stricture; and thus it happens that such an obstruction, which was quite intractable to treatment from above, can, with comparative ease, be dealt with from below.

But even when a gastric fistula has been established it may not be possible to pass a bougie through the fistula into the oesophagus and through the stricture without further assistance. An ingenious method of dealing with such cases was suggested by Hagenbach in 1889.¹ A small shot is fastened to the end of a long thread and then the shot is swallowed. Or a hollow bougie open at both ends is passed down to the stricture and the threaded shot passed through it to the stricture and the bougie withdrawn. The patient then is directed to swallow water, and by its aid the shot is carried through the stricture and appears inside the stomach. It is then caught and drawn out through the fistulous opening in the stomach. A strong silk thread is now fastened to this, and, by means of the end hanging out of the mouth, is drawn up through the stricture. We thus have a strong silk thread passing through the mouth, the oesophagus, and the stomach, the ends of which hang one out of the mouth, the

¹ Correspondenzblatt Schweizer Aerzte, 1889, No. 5.

other out of the gastric fistula. Both ends are then tied together. Every day a bougie is tied to the gastric end of the thread, and is drawn upward through the stricture, which can thus be rapidly dilated. The thread is not finally removed until the stricture is sufficiently dilated to allow of bougies being passed with facility without its assistance. Five cases are recorded in the tables as having been treated by this method. In one of these, Case 13, increasing sizes of violin-strings were substituted for the bougies at first. In Case 15, F. Lange succeeded in passing the threads by means of a fine whalebone bougie passed from above. To the gastric end of the thread he fastened a set of small blades, devised by himself, and then by traction on the other end of the thread coming out at the mouth he drew these blades into the oesophagus and thus performed internal oesophagotomy from below. The gastric fistula was closed on the eighteenth day. Five months later, as the stricture had begun to recontract, he performed internal oesophagotomy again, but this time the incising instrument was passed down from the mouth.

Case 19 shows yet another method of dealing with the stricture with the assistance of a gastric fistula. In this case, Abbe, of New York,¹ first opened the oesophagus near the root of the neck, and then he established a gastric fistula. He then succeeded in passing a very fine conical gum-elastic bougie upward through the stricture. To the end of this bougie he tied a piece of strong braided silk and drew it through the canal. By pulling this string up and down in a seesaw manner over the distended stricture these tissues were gradually and rapidly divided, so that enlarging bougies were quickly able to pass with ease until the normal calibre of the oesophagus was restored. He proposes to call this method the "string" method. The patient was exhibited at the New York Surgical Society four months later, when the result was seen to be all that could be desired.

Electrolysis was the means employed in Case 10 by Hjart, and proved eminently successful. A sound was pushed up the oesophagus from the stomach, its extremity being an electrode; the other electrode was placed on the neck. The internal elec-

¹ ANNALS OF SURGERY, 1893, Vol. xvii, p. 489.

trode was kept pressing against the stricture. The constant current was kept in action for an hour, after which the electrode passed suddenly and with ease up through the stricture.

Such are the chief modifications which have been suggested for what is sometimes called retrograde dilatation of œsophageal strictures. I think the record of cases which I have been enabled to lay before you is most encouraging.

In advocating this method of treatment, we do not propose an operation which is to drive from the field old and well-tried methods of dealing with these cases. We propose a plan, new, it is true, which promises to bring speedy relief to a class of cases which we have been accustomed to look upon as desperate and beyond the pale of the surgeon's art. That they are not so has now been proved ; and those cases which in the future are rescued from starvation and its attendant miseries, as many have been within the past few years, will owe their lives, not so much to him who performs the operation, as to the master mind who devised it,—to Loreta, of Bologna,—who has again taught us that there is no finality in surgery.

ESOPHAGEAL STRICTURE TREATED BY GASTROTOMY AND RETROGRADE DILATATION.

No.	OPERATOR.	WHERE PUBLISHED.	AGE.	SEX.	DURATION OF SYMPTOMS.	CAUSE.	METHOD OF TREATING STRicture.	TREATMENT OF STOMACH WOUND.	R.	REMARKS.
1	Loretta. 1883.	Reported by T. Holmes, Brit. Med. Journal, Feb., 1885.	24	M.	11 months.	Swallowing caustic alkali.	Immediate dilatation.	Stomach wound closed and organ returned to abdomen.	R.	In 18 days.
2	Loretta. " " "	Ibid. Ibid. Ibid.	26 21 ...	F. F. ...	8 years ...	Idiopathic.	" " "	" " "	In 20 days.	
3	Ciani (Florence).	Ibid.	...	...	...	...	...	...	R.	No details.
4		Berlin. klinische Wochenschrift, 1883, p. 685.	...	...	...	Caustic potash.	Sponge-tent passed from below.	Gastric fistula formed.	R.	No details. Seen in perfect health 7 months later by Prof. Loretta.
5		Centralblatt für Chir., 1884.	12	F.	...	Sulphuric acid.	Dilatation with pharyngeal forceps from below.	Gastric fistula.	R.	No details.
6	Frattan (Obesia).	Berlin. klinische Wochenschrift, 1883, p. 685.	...	...	...	...	“Olives” drawn up from below, following rod of a Verneuil's dilator.	“	R.	Fistula healed in 1 month.
7	Herg. maan.	Centralblatt für Chir., 1885, p. 446.	5	F.	...	...	“	“	R.	Death 7 months later from tubercular meningitis.
8	Lenatian.	Centralblatt für Chir., 1886, p. 69.	14	F.	...	Caustic potash.	Electrolysis from below.	“	R.	Fistula closed in 4 months.

CESOPHAGEAL STRICTURE TREATED BY GASTROTOMY AND RETROGRADE DILATATION.—Continued.

No.	Operator,	Where Published.	Age.	Sex.	Duration of Symptoms.	Cause.	METHOD OF TREATING STRicture.	Treatment of Stomach Wound.	Ran. surt.	REMARKS.
11	Maydl.	Wiener med. Zeitung, 1886, p. 287.	22	M.	.....	Crustic soda.	Hagenbach's method. Conical bougies drawn upward.	Gastric fistula.	R.	Gastric fistula not closed at time of publication.
12	Soldani.	Centralblatt für Chir., 1887, p. 787.	24	M.	.....	Sulphuric acid.	Hagenbach's method.	"	R.	Two months later patient improved; but still under treatment. No result given.
13	Soehn.	Schweizer Korrespondenz Blatt, 1889.	8½	F.	.....	"	Hagenbach's method. Increasing sizes of violin strings drawn upward through stricture; each string remaining <i>in situ</i> for about two hours.	"	"	
14	Spannoch.	Raccolitore Med. Focil, 1890, X, 297.	...	...	.....	...	Immediate dilatation.	Stomach wound closed and organ returned.	R.	
15	F. Lange.	New York Med. Journal, 1890, I, p. 131.	4	...	2 years.	Concentrated hydrocyanic acid.	Internal oesophagotomy from below. Blades drawn up by a thread passed by means of a whalebone bougie passed from above.	Gastric fistula.	R.	Fistula closed on eighteenth day. Internal resophagotomy per oram 5 months later.

KENDAL FRANKS.

ESOPHAGEAL STRicture TREATED BY GASTROTOMY AND RETROGRADE DILATATION.—Concluded.

No.	Operator.	Where Published.	Age. Sex.	Duration of Symptoms.	Cause.	Method of Treating Stricture.	Treatment of Stomach Wound.	Re- sult.	RE- MARKS.
16	Terrillon.	Progrès Médical, 1890, xi, 244.	53 M.	Many years.	Idiopathic.	Gradual dilatation.	Gastric fistula.	R.	Fistula open 15 months later, but patient otherwise well.
17	A. Dixon.	New York Med. Record, 1891, xi, 549.	54 M.	...	"	Gradual dilatation 24 days after gastrostomy, first by bougies, then by uterine dilator.	"	R.	Two months later re-constriction. Digital exploration through fistula revealed the cecum to be seat of malignant growth. Fistula closed 4 months later.
18	Kruske (Freiburg).	Beiträge zur klinische Chir., Vol. VIII, 1893, p. 109.	...	...	Injury caused by passing a stomach-pump.	Hangenbach's method.	"	R.	Esophageal fistula closed spontaneously in 2 weeks. Gastric fistula closed by plastic operation after 8 weeks.
19	R. Abbe.	New York Med. Record, Feb. 25, 1893.	F.	...	...	Abbe's "String" method.	Combined gastrotomy and esophagostomy.	R.	
20	Giesler.	Brunn, Beiträge zur klin. Chir., Bd. VIII,	...	...	Idiopathic.	Hangenbach's method, with olive-pointed bougies.	Gastric fistula.	R.	Two months later fistula closed.
21	Kendal Franks.	Present Commu- nication.	24 F.	17 years.	Scrofulitis.	Immediate dilatation with Otis's dilator.	Stomach closed at once and re-turned.	R.	Well 18 months after.